Claims

1. A detector assembly for detecting the presence of a molecule in an analyte comprising:

an analyte carrier having a conducting surface for receipt of an analyte in an analysis region of the surface;
a first laser radiation source arranged to provide radiation directed, in use, to the analysis region to cause Raman scattering;
a first sensor arranged to detect radiation from the first laser radiation source that has been scattered from the analysis region by Raman scattering to detect the presence of the molecule;
a second laser radiation source arranged to provide radiation, in use, to the conducting surface at an angle to the conducting surface such that a field is generated in the analysis region;
wherein the first and second laser radiation sources are arranged such that the field generated by the second laser source causes an enhanced Raman scattering effect of radiation of the first laser source.

2. A detector assembly according to claim 1, wherein the conducting surface comprises a metal film.

3. A detector assembly according to claim 1, wherein the metal film is one of aluminium, copper, silver or gold.

4. A detector assembly according to any of claims 1, 2 or 3, wherein the conducting surface has a thickness of the order 10-100nm.

5. A detector assembly according to any preceding claim, wherein the conducting surface has deposited thereon a reporter dye and a binding molecule for selectively binding to an analyte molecule to be analysed.

6. A detector assembly according to claim 5 wherein the reporter dye is arranged so that, in use, the reporter dye is in the analysis region on binding with a molecule to be analysed and is otherwise outside this region.

7. A detector assembly according to any of claims 1 to 6, wherein the analyte carrier comprises a microfluidic chip.

8. A detector assembly according to claim 7, wherein the microfluidic chip includes at least one channel, a portion of the channel having the conducting surface thereon.

9. A detector assembly according to claim 7, wherein the microfluidic chip includes multiple channels, each channel having at least one portion with a conducting surface thereon, each conducting surface having a different reporter dye deposited thereon.

10. A detector assembly according to any of claims 1 to 6, wherein the carrier comprises a microtiter plate.

11. A detector assembly according to claim 10, wherein the microtiter plate has one or more wells, the or each well having the conducting surface at a bottom portion thereof.

12. A detector assembly according to any of claims 1 to 6, wherein the carrier comprises a prism arrangement,

the conducting surface being arranged on one face of the prism.

13. A detector assembly according to any preceding claim, wherein the second laser radiation source is arranged to provide plane-polarised radiation to the conducting surface.

14. A detector assembly according to claim 13, wherein the second laser radiation source is arranged to provide radiation at or near the critical angle to the conducting surface.

15. A detector assembly according to any preceding claim, wherein the conducting surface has surface plasmons of a surface plasmon wavelength, and the second laser radiation source is arranged to provide radiation on energy at substantially matching the energy the surface plasmon wave.

16. A detector assembly according to claim 15, wherein the conducting surface and wavelength of the second radiation source are selected such that the field matches a band gap of the Raman scattering.

17. A detector assembly according to claim 14, wherein the second laser source is arranged for surface plasmon resonance detection, the detector assembling further comprising a second sensor arranged to detected radiation from the first laser light source refracted from the surface.

18. A detector assembly according to claim 17, wherein the second sensor comprises a single sensor arranged to detect a change in intensity of the refracted radiation to detect the presence of the molecule.

19. A detector assembly according to claim 17, wherein the sensor comprises an array of sensors arranged to detect a change in angle of the refracted radiation to detect the presence of the molecule.

20. An analyte carrier for use in a detector assembly in which laser radiation from a first source is used to detect the presence of an analyte by Raman scattering, and laser radiation from a second laser radiation source is used to generate a field to enhance the Raman scattering, comprising:

- a substrate for supporting the analyte and having optical properties chosen to match the laser radiation from the first or second radiation sources; and
- a conducting surface on a portion of the substrate for receipt of the analyte.

21. An analyte carrier according to claim 20, wherein the conducting surface comprises a colloidal metal film.

22. An analyte carrier according to claim 21, wherein the metal film is one of aluminium, copper, silver or gold.

23. An analyte carrier according to claims 20, 21 or 22, wherein the conducting surface has a thickness of the order 10-100nm.

24. An analyte carrier according to any of claims 20 to 23, wherein the conducting surface has deposited thereon a reporter dye having a binding molecule for selectively binding to an analyte molecule to be analysed.

25. An analyte carrier according to claim 24, wherein the reporter dye is arranged so that, in use, the reporter dye is in the analysis region on binding with a molecule to be analysed.

26. An analyte carrier according to any of claims 20 to 25, wherein the analyte carrier comprises a microfluidic chip.

27. An analyte carrier according to claim 26 wherein the microfluidic chip includes at least one channel, a portion of the channel having the conducting surface thereon.

28. An analyte carrier according to claim 26, wherein the the microfluidic chip includes multiple channels, each channel having a portion with a conducting surface thereon, each conducting surface having a different reporter dye deposited thereon.

29. An analyte carrier according to any of claims 20 to 25, wherein the carrier comprises a microtiter plate.

30. An analyte carrier according to claim 29, wherein the microtiter plate has one or more wells, the or each well having the conducting surface at a bottom portion thereof.

31. An analyte carrier according to any of claims 20 to 25, wherein the carrier comprises a prism arrangement, the conducting surface being arranged on one face of the prism.

32. A detector for detecting the presence of an molecule in an analyte on an analyte carrier having a conducting surface for receipt of an analyte in an analysis region of the surface, comprising:

a first laser radiation source arranged to provide radiation directed, in use, to the analysis region to cause Raman scattering;
a first sensor arranged to detect radiation from the first laser radiation source that has been scattered from the analysis region by Raman scattered from the analysis region by Raman scattering to detect the presence of the molecule;
a second laser radiation source arranged to provide radiation, in use, to the conducting surface at an angle to the conducting surface such that a field is generated in the analysis region;
wherein the first and second laser radiation sources are arranged such that the field generated by the second laser source causes an enhanced Raman scattering effect of radiation of the first laser source.

33. A method of detecting the presence of a molecule in an analyte, comprising:

- providing the analyte on an analysis region of a conducting surface;
- illuminating the analysis region with first laser radiation to cause Raman scattering;
- detecting radiation scattered from the analysis region by Raman scattering to detect the presence of the molecule;
- simultaneously illuminating the conducting surface with second laser radiation at an angle to the conducting surface to generate a field in the analysis region; and
- wherein the field generated in the analysis region enhances the Raman scattering effect.